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Examiner: A. Chambliss
Art Unit: 2814

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : K. TATSUMI et al.

Serial No. : 09/254,118

Filed : May 19, 1999

For : METHOD OF PARTIALLY PLATING SUBSTRATE FOR ELECTRONIC DEVICES

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Assistant Commissioner
for Patents
Washington, D.C. 20231

AMENDMENT

SIR:

Kindly amend the claims of the above-identified patent application as follows.

Cancel claim 5.

--1. (Twice Amended) A method of partially plating a substrate for electronic devices, comprising arranging metal balls at selected portions of a substrate for mounting semiconductor devices thereon, and adhering or bonding the metal balls thereto, and melting the metal balls resulting in the metal balls being thermally diffused with the substrate, thereby selectively plating the selected portions of the substrate for electronic devices with a different metal.--

--2. (Amended) The method of partially plating a substrate for electronic devices as claimed in claim 1, wherein the method comprises provisionally arranging and holding the metal balls on an arrangement base plate having

through holes provided at positions corresponding to the portions to be plated of the substrate for electronic devices, transferring the arrangement base plate above the substrate for mounting electronic devices, and adhering or bonding the metal balls provisionally arranged at and held by the through holes to the portions to be plated, respectively.--

B2 cont'd

--3. (Amended) The method of partially plating a substrate for electronic devices as claimed in claim 2, wherein, in the provisionally arranging and holding procedure, excess metal balls adhering to the arrangement base plate or the metal balls which are provisionally held by the substrate are removed by applying vibrations to the arrangement base plate, thereby provisionally arranging and holding the metal balls.--

B3

--6. (Twice Amended) The method of partially plating a substrate for electronic devices as claimed in claim 1, wherein the metal balls are selected from Au, Ag, Pd, Pt, Ni or Cr, and balls are melted by partial heating.--

B4

--10. (New) The method of partially plating a substrate for electronic devices as claimed in claim 1, wherein the metal balls are solder, and the metal balls are melted by reflowing to selectively plate the selected portions of the substrate for electronic devices and with a metal layer different from a substrate metal and the ball metal intervening between the substrate metal and the ball metal.--

--11. (New) The method of partially plating a substrate for electronic devices as claimed in claim 1, wherein the metal balls are selected from Sn alloy or In alloy and the selected metal balls are melted by reflowing to selectively plate the selected portions of the substrate for electronic devices with a different metal.--

REMARKS

Reconsideration of the above-identified patent application, as amended, is respectfully requested. The present amendment is responsive to the Office Action mailed October 22, 2001. A petition for an extension of time in which to respond to the Office Action accompanies this amendment.

By the present amendment, claims 1-4 and 6 to 11 are pending in the application.

Support For Claims

In response to a rejection under 35 U.S.C. §112, second paragraph, "small balls" has been replaced with --metal balls--. Metal balls are disclosed in the specification, e.g., at page 3, line 33.

Claim 1 has also been amended to specify that the metal balls are thermally diffused with the substrated. This is supported in the specification, e.g., at page 3, lines 33-34.

In claims 2, 3 and 6, the term "small balls" has been replaced with --metal balls--.

New dependent claim 10 corresponds to canceled dependent claim 5 with the metal balls being defined only as solder. In new dependent claim 10, the phrase --with a metal layer different from a substrate metal and the ball metal intervening between the substrate metal and the ball metal-- is supported in the specification, e.g., at page 4, lines 4-5.

New dependent claim 11 corresponds to canceled dependent claim 5 with the metal balls being defined as Sn alloy or In alloy.

New matter is not being presented by the present amendment.

§112, ¶2

Claims 1-9 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Office Action objected to the phrase "small balls" as being vague and indefinite.

In response to this rejection, the claims have been amended by the present amendment to change the phrase "small balls", where appearing in the claims, to --metal balls--.

In view of the present amendment, it is respectfully requested that the rejection under 35 U.S.C. §112, second paragraph, be withdrawn.

§102/§103

Claims 1-6 were rejected under 35 U.S.C. §102(b) as being anticipated by Japan No. 5-129374 to Okuyama.

Claims 5, 7 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 5-129374 to Okuyama in view of U.S. Patent No. 5,762,258 to Le Coz et al.

Claims 6 and 9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japan No. 5-129374 to Okuyama in view of U.S. Patent No. 4,980,240 to Dunaway et al.

These rejections, as applied to the amended claims, are respectfully traversed.

Patentability

In accordance with the present invention, as defined in amended independent claim 1, the metal balls are melted resulting in the metal balls being thermally diffused with the substrated thereby selectively plating selected portions of the substrate.

In Japan No. 5-129374 to Okuyama, the metal balls 2 are welded to the pads 8 utilizing a hot plate 12. See last line of the English language abstract of Japan No. 5-139374 to Okuyama. This does not disclose or suggest the present invention as defined in amended independent claim 1, wherein the metal balls are thermally diffused so as to form a plating or a coating and do not form a bump as taught by Okuyama.

The secondary references, U.S. Patent No. 5,762,258 to Le Coz et al. and U.S. Patent No. 4,980,240 to Dunaway et al do not disclose or suggest this deficiency in the Okuyama reference.

It is therefore submitted that amended independent claim 1 is patentable over Japan No. 5-129374 to Okuyama standing alone, or in combination with U.S. Patent No. 5,762,258 to Le Coz et al., or U.S. Patent No. 4,980,240 to Dunaway et al.

Since independent claim 1 is patentable, claims 3-4 and 6-11, dependent thereon, are patentable.

CONCLUSION

It is submitted that in view of the present amendment and foregoing remarks, the application is now in condition for allowance. It is therefore respectfully requested that the application be allowed and passed to issue.

Respectfully submitted,

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